

THE large debt incurred by the introduction of the Croton water, makes it the duty of those having charge of the interests of the city, to encourage the increase of its taxable property, so as to lighten the burden on what is now taxed.

Every improvement which increases the desirableness of a residence in New York, promotes that result; and tends to withdraw from Brooklyn, Williamsburg, Jersey City, Staten Island, Hoboken, and Astoria, those who transact business here, but live there, where alone they are taxed. Strangers coming to the city, would determine on their residence by the same rule.

The following article, on the sewerage of the city, was written and published in the firm belief that the adoption of a proper system of drainage would complete the great advantage secured to us by the introduction of the Croton, and promote the more rapid growth of the city.

The ordinances of the Corporation, (passed when we were without the Croton water,) prevent, by heavy penalties, the use of sewers, except for the water drainage. We have attempted to show that the law should *now* be repealed, and the sewers be devoted to the discharge of the *refuse*, under proper regulations.

At the present moment, sewers are constructed without regard to that object; and the building of these should be arrested, until a well-devised plan be arranged. No wish is entertained, in any quarter, to have the Corporation do more in the matter than determine *on the right plan of construction, and the proper use of the sewers*; and, from time to time, as owners petition for them, whether the particular application should be granted. The construction of them, under such a system, will be gradual.

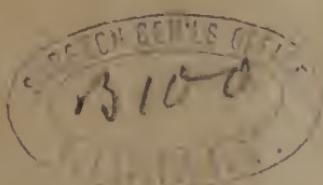
No debt is to be incurred by the city. On the contrary, the sewers are to be paid for by those who ask for them, and who are best qualified to determine on their ability to pay. Should the building of any given sewer be opposed by a minority of owners, their rights should be duly regarded.

The ground that some particular sewers, or particular situations, are not suitable, concerns matter of detail not requiring examination in a discussion of the general question.

In the hope of calling the attention of property owners to this important subject—next only in importance to the introduction of the Croton—the article, originally prepared for Hunt's Magazine, is republished in the present form, without any pretension on the part of the author to more knowledge about the matter it treats of, than might easily be acquired by almost any citizen, with very little labor.

G. B. B.

January, 1845.





THE
SEWERAGE OF NEW YORK:

AN ARTICLE FROM

HUNT'S MERCHANTS' MAGAZINE,

FOR

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THE city of New York stands unrivalled for the magnificence and extent of her works for introducing water into houses; as yet, however, no provision has been made for its discharge.

The stream which was arrested in its progress through its own channel to the sea, and turned into the city of New York, through a well constructed aqueduct, has now no proper means of escape to the ocean; but is nevertheless brought in from day to day through an unfailing medium, and poured into the earth, to find its way slowly through vaults and cellars, and among foundations, to the great reservoir into which all waters descend.

From this source, and the consequent accumulation of rain and spring water, injury has already resulted, in the extensive partial filling up of cellars by the water—a serious evil lies before us in its probable effect upon health. The question is, when and how these shall be remedied?

It is but little the custom of America to provide in advance of actual difficulty, for dangers which proper care might prevent; but when we have examples, and the warnings of the old world, in regard to a particular evil, spread before us copiously; (examples and warnings founded on bitter experience,) it may well be deemed matter of astonishment, if not of just reproach, against our public men, that they are not regarded.

We do not think there can be any difference of opinion among reflecting people as to the fact that many of the diseases which appear in various quarters of our state, derive their origin, and others, their malignant type, for the most part, from defective drainage. This city, in addition to all the natural elements of this danger, is obnoxious to more than usual suffering from having an entire river turned into the bowels of the earth, to linger there, until it can find its way through an unfavorable sub-stratum to the sea.

Dr. Thomas Southwood Smith, physician of the London fever hospital, who has earned for himself, by his published works, a wide and just celebrity, was called before a committee of Parliament for examination in regard to fevers in London, and he states that when a fever exists, its locality may be determined by an inspection of the map of London, in the office of the commissioners of sewers, "for where the sewers are, there the fevers are not, where the sewers are not, there the fever is."

London, for years back, has been aware of this difficulty; and by the most unwearied efforts, has been endeavoring to correct it. The extent, and excellency of her sewers has long been a matter of wonder to all of that class of travellers who go abroad with some useful object, and so famous have they become, that her example is about to be imitated in many quarters of Europe; the opinion being universal, that the system has the marks about it of the best intelligence and wisdom which are concentrate in that great metropolis.

We have no means of arriving at the exact extent, indeed they have not in London, of the sewers already constructed in the seven districts into which that city is divided. In two of them, the Holborn and Finsbury divisions, there are three hundred and fifty-three miles of sewers, and of drains leading into them. This enormous quantity, in two districts only, enables her to outstrip, far, the boast which Rome for ages was able to make, that she was unexcelled in those important contrivances.

We remember as long as we can remember anything of Roman history, her famous cloaca, or sewers, which were so capacious that barges were said to have floated through them. Their construction was attributed by many to the time of Tarquin, but such was their size, that they were supposed by others to be the remains of an older city, "their dimensions being considered disproportionate to the then infant city of Rome." Vitruvius, however, shows that the supposition was erroneous. "The Romans," he says, "were a peculiarly municipal people. When the external walls were built, the next object was, the best means of disposing of the area between them; the streets were set out to exclude winds injurious to comfort, and all the sewers and drains were well considered. Laws were established, which prevented individuals from doing anything which could interfere with the public health or enjoyment. These were the first and chief considerations. Every man in Rome had a cistern, and a constant supply of water for domestic purposes, as well as drains into the common sewer, which was discharged into the Tiber, and the whole was under the control and management of proper officers."

There appear to be but few engaged in the management of our public affairs, to whom this picture of municipal excellence would apply; but its truth may be understood, from the fact, that after the lapse of three thousand years, these works still stand, though subjected to daily use.

The people of the city of New York, stimulated by the cry that municipal reform was needed, have borne into power a new set of men, and we are yet to see whether they have raised those into office who are above all petty intrigues for place, and patronage, and who come up to the dignity which appertained to the Roman legislators.

Perhaps no city in Europe, in the steadiness of its legislation, and the intelligence with which it is directed, equals the excellency of London, where all her works are solid and durable, as well her houses and docks, as her sewers. Boston comes nearer to that standard than any of

our cities, where the qualities of which we have spoken, direct her municipal affairs.

In both cities, an extensive system of sewerage prevails, though limited in its uses in Boston, owing to the want of a sufficient supply of water—a want soon to be remedied by her inhabitants.

It would seem to be almost presumptuous, in any one, however enlightened and scientific, to doubt the value of the experience, or the wisdom of the practices pursued by two such cities, in the one case for half a century,* and in the other for nearly a quarter; and in both, persisted in with an energy, which shows that the best minds are satisfied with its efficiency and necessity; but yet, in the city of New York, there are those who shake their heads as gravely when this subject is spoken of, as though (to use the language of Mr. Webster,) they could shake something out of them, to show that the plan was erroneous.

In London, the sewers are used, not only for the discharge of the water brought in by private companies, but also for the removal of the offensive matter which is formed in the city, and in some instances for the sweepings of the streets. In Boston, they are used for liquids, and for comminuted solids, the want of water compelling them to more care than is observed or required in London. Boston is about to bring in the water from Long Pond, to enable her, among other things, to extend and improve her system of sewerage.

New York, in her arrangements for the introduction of water, far excels any other city in the world. Not only has she provided abundantly for the present wants, but also for the future growth of the city. There she stops short in her enterprise, with the plan but half completed. Had the commissioners been contriving a way to bring serious hurt upon the community, in its property and health, they could not better have accomplished it, than by pouring a large stream into the earth, without devising the means for hastening its progress to its proper destination; but such was not their intention, it being fair to infer from their reports on the subject, that some provision, in that respect, was expected to follow the introduction of the water.

The injuries to property are now occurring; those to health are to follow in their train. People are now discussing the question whether or not they shall fill up their vaults and cellars above the present water level—a level, higher to-day than it was yesterday, and all the time rising; and others are considering whether it is expedient to take the water into their houses until sewers are constructed, the owners taking the ground which Mr. Quick testifies to as being taken in London, that without a proper means of discharge, it will be an injury to take it into the houses. Mr. Hawkesby states that "a good supply of water will be of little value without an efficient drainage, and that the use of the water, however liberally supplied, will be limited and restricted by any inconvenience attending its removal."

Those who observed the streets during the last winter, remember what quantities of ice there were, wherever the Croton was discharged, rendering the travel dangerous, and the occurrence of a sudden storm of rain falling on the surface, elevated by the ice, the certain cause of over-

* The sewers in London were commenced in the time of Henry the VIII. They were devoted to the purposes for which they are now used, in 1804.

flow into the areas. When the high bridge is built, this difficulty will be greatly augmented, for then the supply of water will be immensely increased.

In every way does this operate injuriously to the city, which loses in expense for clearing away the frozen streets, and in the want of customers for the water, enough, perhaps, to pay the interest on the outlay for sewers, even if she constructed them at her own expence, which is not in any quarter urged, and is not expected. The owners are quite willing to do this, when the matter shall have been arranged by the corporation on a proper plan.

It never can be that New York will submit to such a state of things, as a final and complete arrangement; it can only be tolerated in that shape, as an evil requiring time for its removal; but the citizens expect that the proceedings, to that end, will be commenced, and commenced soon enough to show that whatever of energy can be devoted reasonably to the subject, will be employed.

Taking it for granted that sewers must be constructed either at the expense of the city, or of the individual owners, the question is, on what terms, and how rapidly the latter will proceed with the enterprise, and save the city the necessity of engaging in it, in its corporate capacity, with its train of evils, public patronage, a public debt, and greater cost than individual owners would need to endure.

The question is easily answered. Compensate the owners for the outlay, by devoting the sewers to the purposes for which they are used in London and Boston, with fewer advantages than we possess, purposes which in New York are now unlawful, and made the subject of penalties, and they will very soon and very cheerfully go on with the work.

No public matter was ever started, except the one for the introduction of the water, which has the approval of the great body of property owners so entirely as the one in question. It has been well canvassed, and is well understood; and the prejudice which seemed to prevade many minds against the change, at the first blush, has been entirely overcome; they are not only willing but anxious for the adoption of the London system.

It is undoubtedly too much to say, that all are convinced; some who have not examined the subject, have yet decided against it; others object for reasons that must be deemed without weight; one is, that it will injure the fish market!! another, that the earth, at New York, is of higher temperature than at London, at the required depth for sewers, and that it tends to promote more rapid decomposition, as if the objection did not apply with ten-fold force to the present system; another, that the tides do not rise and fall as much as at London, as if it were possible to use the tide waters for cleansing, where the ground was high, and the grade good, or ever, except for defects, not existing in New York; another, that our present sewers will not answer, because the bottoms are laid in loose sand, as if it were out of the reach of human skill to spread a coat of cement over them; another that some of the French sewers have become choked, as if it were possible to use them without water, which the French have not, but are about to introduce. The minds of not a few are so constituted, that it would take years to satisfy them that any thing indelicate, offensive or unhealthy, belongs to our present habit of constructing and using a small but conspicuous building, (not "perched upon a hill always," but always exposed to view,) in a way to shock those of delicate minds.

Underneath those structures accumulates the material which induced the Rev. J. Clay, in his report to Parliament, to describe them as "reservoirs of contagion." Read to them from the report to the queen from the duke of Buccleuch, and the able committee of which he was chairman, what they so forcibly state in regard to the effect of our plan upon the public health, and it makes no impression on their understandings. What that committee states, cannot too often be repeated, or too deliberately weighed.

"The medical witness," (say they,) "have brought before us facts in support of their strongly urged and unanimous opinion, that no population can be healthy, which lives amid cess-pools, or upon a soil permeated by decomposing animal or vegetable refuse, giving off impurities to the air in their houses and in the streets. They state the necessity of preventing all accumulations of stagnant refuse in or near houses, and of substituting a system of house-drainage and cleansing, aided by the introduction of better supplies of water into the houses."

We all know the mode by which, in England, their executive and legislative establishments proceed to ascertain the steps proper to be taken in regard to any given subject, to remedy any existing evil. A commission is appointed by them, sometimes formed from the Parliament, and sometimes from the community at large, to take the testimony of skilful persons in regard to the particular subject, and report it, with a general view of the whole matter, to the body whence the commission emanated.

A large amount of useful and accurate information is thus collected from expert citizens; and when the matter comes to be legislated upon, it is all scrutinized carefully, and the laws have impressed upon them, not only the intelligence of the law giver, but the assent, in advance, of the best wisdom of the community. They may then be written "with a pen of iron upon tablets of marble."

Information so precise, and ample, on the subjects thus investigated, is not to be obtained from any other quarter, so well as from these reports; and we may appeal to them, with a certainty which ought to overbear and put to shame, every opinion formed without the same lights, and on the strength of a prejudice, resulting from different habits. The committee which investigated this subject was composed of eminent men, who, during the year 1843 and part of 1844, patiently investigated the subjects committed to them, the drainage being the chief, and made a report to the queen, who presented it to both houses of Parliament. This report, with the documents appended, occupies about 700 printed folio pages, and gives, not only general views, but all the detail necessary to enable persons to form accurate opinions on the whole matter.

The general object of inquiry, so far as related to the sewerage, was the improvement of defects in parts of London, and the establishment of the system, wherever practicable, throughout England and Wales.

The leading fact deducible from the whole investigation is this: that flowing water is the essential element in the perfection of a good system of sewerage, and that without it in sufficient abundance to cleanse and purify drains devoted to the discharge of the refuse, they are more offensive than useful. "The drains furnish the ways or vehicles for transportation, the water is the moving power or carrier," is the language of one of the royal engineers to the committee. "It is indisputable," (says Mr.

Myrne, engineer on the French works,) "that water is the best and cheapest means of removing all decomposing matter."

Where flowing water exists in sufficient abundance, the descent in the sewers is not required to be so great as with a diminished supply. Mr. Hosking, professor of architecture of Kings College, thus testifies on this point. "I have found, from experience, that sewers moderately well supplied with backwater, may be made with much less fall than is generally considered necessary, and less than this bill requires," (2 1-2 inches per 100 feet.) "I myself directed the diversion of one of the large sewers at the western extremity of London, the Counters Creek sewer, for a mile and a half of its length; and for the purpose of obtaining deeper drainage at the upper end, I prevailed upon the commissioners to allow the fall to be at the slight rate of 1.63 inch—less than 1 3-4 inch in 100 feet throughout the diverted length, the sewer being the course of a small stream, the drainage of the uplands. With this small stream, the sewer, with its slight fall, is kept perfectly clean; no accumulations of any kind take place in it; and I think I may assume, therefore, that a fall of 2 inches in 100 feet, with a good back water, at frequent intervals, would be sufficient."

Indeed, upon a perfect level, by collecting the ordinary flow in the sewers, by means of gates, until a sufficient head is obtained, the drains may be kept perfectly clean by the rush, the operation being called "flushing." "We have a sewer building on a dead level, (says Mr. Roe, one of the commissioners of sewers,) in consequence of the difficulty of the outlet, in that case we have placed a gate for 1,600 feet, and we are in hopes we shall do with a greater distance than that hereafter; but that is the greatest length we have had an opportunity of working in a horizontal direction." He also states: "We have found the system of flushing effectual on a horizontal line." The experiments presently to be given, will be conclusive as to the efficacy of this system. If we have not water enough to keep the drains free of matter undergoing decomposition, the plan ought not to be persisted in for a moment, certainly not beyond the steps necessary for an experiment, which can do no hurt, and may settle all conflicting opinions, there being none to desire the adoption of the London system, except for the benefits to be conferred by its success.

The great question, then is, whether in New York the water is to be had in sufficient abundance for the purpose.

The city of London, with a population of 2,000,000, has a daily supply from the various water companies, of 28,774,000 gallons per diem, which, for 177,000 houses, gives 162 gallons per diem to each house, and this, in addition to the rain water, constitutes the chief reliance of the city for cleansing the sewers. The tidal waters of the Thames are used for the sewers built where the ground is low enough to admit the tide, and the descent inadequate, but they are not, and cannot be used except where these defects exist.

The population of New York is 350,000, and she has 38,000 houses. New York, at the rate of the London supply, would require for her 38,000 houses, only 6,156,000 gallons daily.

Her aqueduct is constructed to bring down from the Croton the enormous quantity of 60,000,000 gallons daily, or over 1,578 gallons to each house per diem, being an excess of 1,416 gallons, for each house, every day over the London supply.

The capacity of the Croton to supply this quantity, except during the dry season of the year, is undoubted, and during that season it may be obtained, by using, in addition to the ordinary flow of the river, in the time of the greatest drought, the quantity stored in the dam, amounting to 496,000,000 gallons, and resorting to ponds in the vicinity, the water in which may be stored in reservoirs, and introduced at very little expense.

The minimum supply, however, without resorting to the ponds, is altogether sufficient for all purposes; that, during September and October, (the months when the Croton is lowest,) is 35,000,000 gallons daily, the dam supplying 8,000,000 of that quantity.

Major Douglass, the engineer who made the preliminary surveys, states that "it was on the 5th of September that I gauged the Croton at Wood's bridge, and it was then discharging at the rate of 51,522,480 gallons per diem; to which, if we add 3,628,800 discharged from the Muscoot, and reduce the aggregate in the ratio of one-fifth, to meet extremes of drought, like that of 1816, we have still remaining a regular running supply of 44,120,924 gallons per diem, without resorting to the 20,000,000 daily obtainable from reservoirs."* When the gauge was taken, there had not been, at that time, an entire rainy day for sixty-two days, and the testimony of witnesses was, that the streams were "very low," "seldom lower," and according to some, "never."

For the purposes of great caution, a smaller quantity was assumed by Mr. Jervis as the minimum, and yet so enormous is it, that it furnishes 921 gallons per day to each house in the city. This quantity furnishes over 29 hogsheads for each 25 feet of sewer, 14 1-2 to come from each of the two opposite dwellings on any given street, enough to fill up that length of sewer, when built of the proper size, from four to six times per day, a quantity exceeding far any supply, for that purpose, known of in the world.

Not less liberal are the arrangements in New York for receiving and distributing the water. The receiving reservoir, at eighty-fourth street, holds 150,000,000 gallons, the distributing reservoir, 21,000,000. The water flowing in was shut off last year for fourteen days, and was diminished but one-fifth.

The mean annual rain at New York is 36 inches; at London, with lighter, but more frequent rains, only 32 inches. Upon a well constructed plan of sewerage, both the Croton, and the rain water, would be used for the sewers, the former, after it had performed its domestic uses, the latter, either from eisterns, (if any need for storing it existed,) or as it fell, care being taken to provide against any overflow in the sewers.

The obvious remark to be made upon this statement, as to the water, is, that unless there is something peculiarly bad about the grade of our city, we are so much better off than London, in relation to the supply, that her citizens would hesitate not a moment about devoting the sewers to the purposes we have mentioned.

In relation to the grade of New York, and its position, so far from being inferior to that of London, we have advantages nearly as great and controlling as those founded on our superior supply of water.

All the sewers of London must descend from the outskirts of the city towards the Thames, which washes but one side of London; the sewers

* This was exclusive of the water to be obtained from the main dam.

thus lose the benefit of the sharp descent at the river side, which, from the necessity of deep cuttings through it, becomes an inconvenience. Some of the cuttings are 32 feet, requiring during the work a massive frame work to shore up the houses. A noble stream runs on either side of New York, and the sewers may run from the central elevation, into both rivers at a regular depth. This advantage is immense. In London, the sewers must necessarily be long, and many of them crooked, and have innumerable collateral drains, while in New York, they may generally be straight and short. It should be deemed a cardinal point to have them as free as possible of each other, a principle departed from most unnecessarily in connections with the sixth and third avenue sewers.

The offensive substances are discharged at London into fresh water, which becomes contaminated; in New York, into salt, which disinfects; one is distant from the sea, the other nearly adjoins it. The tide falls in the Thames so as to expose the bottom extensively, upon which the sewers discharge, rendering the air offensive; at New York, the bottom of the rivers is never disclosed. It is difficult to keep the tide out of the London sewers; in New York it will be otherwise, but requisite; and, above all, the London sewers can only be ventilated at one end; ours may be connected in the centre, and left open at both rivers, for the sweep of a current of air, and with enough water, be kept free of offensive odors.

Before the extensive introduction of water into London, and the change from the flat bottom to the elliptical shape for sewers, opinions prevailed in regard to the required descent, that have since been entirely abandoned. The old regulations required a descent of one inch and a quarter in every ten feet, where they carried off solid matter. These have been changed, and in the Westminster Commission, the rules now prescribe "that the current of all sewers to be built, be regulated by the commissioners, according to the surface to be drained." In the Holborn and Finsbury, the largest district, the regulations provide that the inclination "be not less than one-quarter of an inch to every ten feet in length, and as much more as circumstances will admit in those portions that are in a straight line, and double that fall in portions that are curved." These restrictions, although of comparatively recent date, it is found, may be departed from, and they are.

The surveyor of the Westminster district is asked, "What is the minimum fall you require?" "There are some of our main sewers with only half an inch to one hundred feet, others $2\frac{1}{2}$ to one hundred feet; some less than that, but that is the exception, not the rule." The commissioner of the Holborn and Finsbury district states that "there are places where they cannot get a quarter of an inch in ten feet," and that they even build them on a dead level, as we have before shown. Much of London is built upon ground formerly a swamp, from which the tides are excluded by an embankment that gave way last fall, owing to the power of a freshet, causing much injury to property. The tides are excluded from the sewers there, by heavy flaps at the mouth, rendered necessary from the fact that the pavement of many of the streets is lower than the water at high tide.

In New York, we have no ground of that character—none not considerably above the highest tide—and very little with a descent so small as the minimum grade prescribed by the Holborn and Finsbury rules. Stuyvesant meadows and Canal street furnish the lowest grades in New

York ; but with good sewers no difficulty would be experienced, even in those quarters.

For a long time, it was the rule in New York, to lay out the streets at a descent not under ten inches in every hundred feet, and many of the streets have that descent. From Union Square the fall is eight and two-tenths inches per hundred feet : from the Park it is still greater, the distance being less to the river. The elevation of Union Square is forty-two feet above high-water mark, that of the Park thirty-eight.

The superiority over London, in respect to the grade and general shape and position of the city, as well as the abundance of water, is therefore indisputable. From our highest elevations, the Croton would come down with immense power and velocity.

The power of running water, at various velocities, is thus given by Professor Robinson, in his treatise on rivers :—

That a velocity, at the bottom of a stream,

of 3 inches per second, will separate and lift up particles of fine clay.

6 " " " " " fine sand.

8 " " " " " coarse sand.

12 " " " will sweep along and lift up particles of fine gravel.

24 " " " " " gravel 1 inch in diameter.

36 " " " " " { angular stone the size of
an egg.

The Croton is brought into New York at a descent of one foot and one inch per mile, for most of the distance, and at less than one foot for part of it ; and yet, with this slight descent, has a velocity of about 100 feet* per minute, or 20 inches per second, which, according to the table of Professor Robinson, would be nearly enough to " sweep along and lift up gravel one inch in diameter."

The velocity of water running in an aqueduct is increased by the quantity and descent, and is retarded by the amount of substances in it, held in suspension ; and so its velocity in sewers cannot be determined from that of the Croton in the aqueduct, without having particulars not yet to be obtained.

The descent from Broadway, at Canal street, exceeds that of the Croton aqueduct, at the rate of 4 feet and 11 inches per mile ; and from Union Square the excess is about thirty feet per mile, enough, with a well constructed sewer, and a sufficiency of water, to sweep away the heaviest impurities.

" What is the rate of fall (Mr. Kelsey is asked by the London Commission) upon the sewer upon which you have spoken ? "

A. " It varies : some parts are about half an inch to ten feet."

Q. " You consider that rate of fall a good fall ? "

A. " Yes : the water runs from Moorgate street at such a rate that I cannot stand against it. It all depends upon the quantity of water. The same fall with a small quantity will be sluggish, when a large quantity of water makes a torrent of it."†

Mr. Beck, Surveyor of Water Commissioners, is asked before the same Commission,—

* Mr. Douglass' Report, page 404.

† The owner of the building at the corner of Carmine and Varick streets informed me that the current in the " Sixth Avenue Sewer," in front of his premises, was such that it would carry a paving stone to the river—its descent is $2\frac{1}{2}$ inches to 100 feet.

"Are your drains made on a particular fall?" and answers, "Where I could get the fall, I like it about 1-4 of an inch to ten feet, (the precise fall of the 6th Avenue sewer.) I think that is desirable, but there are sewers where we have only the 1-8 of an inch fall."

Q. "Have you found they keep themselves clear?"

A. "Yes, they act exceedingly well."

Q. "Is that the least fall you have known?"

A. "No: I have put a drain on a dead level; that will not act quite so well, but the others do very well."

Q. "For whom did you put in that drain?"

A. "I put in a sewer for Mr. DeBauvoir, 3,000 feet long, on a dead level, which I was obliged to do, from being unable to obtain a fall."

Q. "Do you find that sewer keeps clean?"

A. "That sewer has been built 10 years, and it has never been cleaned."

Q. "Is it subjected to any flow of water from any manufactory?"

A. "No: it is from Hoxton new town, or DeBauvoir town."

Q. "Does it receive any flow of water from the tide?"

A. "No."

Q. "Is there much discharge from the mouth of it?"

A. "It discharges into another sewer, in Kingsland road, belonging to the Holborn and Finsbury division."

Q. "Is there a considerable fall in the sewer into which that empties?"

A. "No: that is nearly a dead level, also."

One of the most intelligent of the witnesses examined on the Commission is Mr. John Roe, for a long time a Commissioner of Sewers, and the originator of most of the improvements in their shape, and the mode of cleansing. He is asked:—

"What is the general fall in your sewers? what do you consider a fair fall?" and he answers, "I find in the regulation of the Commissioners, a fall of a quarter of an inch, in ten feet, is required as the least fall; but we give them as much fall as we can. There are places where we cannot get a quarter of an inch in ten feet."

Q. "In that case, do you find flushing effectual in a horizontal line?"

A. "Yes."

Some experiments in flushing are given by him as follows:—

"Head of water 18 1-2 inches; quantity 45 hogsheads; cleared away 1 1-2 inch of deposit from 300 feet of sewer, part of the bottom on a dead level."

"Head of water 10 inches; quantity 20 hogsheads; deposit heavy; flush cleared away 1 $\frac{1}{4}$ inches from 330 feet of sewer."

"Head two feet; deposit in sewer composed of small pieces of brick, stones as large as walnuts, oyster shells, decomposed animal and vegetable matter; proportion of matter carried away 1 to 16 of water."

"Head two feet; deposit in sewer composed of soft mud, and all descriptions of filth, and a little silt; proportion of matter 1 to 6 1-2 of water. This was conveyed 2,400 feet."

Where the streets, such as 14th street, extend from river to river, the number of houses required to fill up the lots, is about seven hundred, one half of which, say 350, would fall on the east side of Broadway, and one half on the west, and each half would be accommodated with a sewer extending in different directions. One hundred and seventy-five of those houses on each side of any particular street, making 350, would have 5,775

feet of sewer, (taking the width of avenues into view,) requiring to be cleansed, for which their share of the Croton, per diem, would be 5,075 hogsheads, or nearly one hogshead to every foot of sewer.

We have, therefore, a much larger supply of water than London, and not only a large, but a liberal supply—a far better grade—immense advantages in position over her, and are without her disadvantages, which are numerous ; and London hesitates not a moment about extending the plan with all possible rapidity, and refers to it, as that which exempts the city from disease—which bestows immeasurable comforts on the people—and produces the cleanliness that justified the boast of one of her citizens, that when New York left off cleaning the city, it was dirtier than when London, at any season, began.

In the message of the Mayor, the advantages enjoyed by us over London, are grouped together forcibly ; and in presenting the matter to the Common Council, he has exhibited the foresight which justly appertains to his position. If the two points be established, that the grade is good, and the water abundant—controlling points always—the feasibility of the plan indicated is unquestionable, and the question arises, whether the advantages of the system warrant a resort to it ?

The sewers must be constructed for the water drainage, at all events ; in that is involved all the expense that would be required if the two objects, the discharge of the water and the removal of the refuse, were united.

We have already the water power, which is the moving power, and the cheapest that can be applied. No expense is to be incurred for that. The question then is, whether, having the power, and needing the sewers for other purposes, we shall, when they are constructed, use them to carry off the refuse in whole or in part, and construct them with that view.

Capt. Veitch, whose testimony we have before referred to, thus forcibly presents this matter to the London Commission :—

“The supply of water in towns flowing from an elevated reservoir into main pipes, and from these spreading by branches through the streets, and finally distributed by service pipes to each dwelling, is just such an arrangement as would be most useful to cleansing away refuse into the sewers, if required for no other purpose ; but the beauty of the union of the two subjects, is that the water upon such a system, after supplying all the domestic wants of man, is equally fit for cleansing away dirt and refuse, and at the moment it is dispensed for household purposes, it begins again to collect in the house drains, carrying all the house filth with it ; the contents of the house drains unite in the street sewer, and gain force for greater scourage, by accessions from the street gutters.”

It would seem not to require argument to show that the city would overlook an important duty, did it not unite the plan of removing the refuse with that of the water-drainage, when the union is to cost nothing.

“The supply of water to a town, and the discharge of the refuse, are two branches of the same subject,” is the language of Capt. Veitch, to the Commission, and he expresses what ought to be apparent to every mind.

Instead of resulting in expense, it will accomplish a large saving ; not of money merely, but—if we believe the medical witnesses of London—a saving of human life.

No other mode can be devised which will dispense with those “reservoirs of contagion,” amounting, in New York, to over thirty-eight thou-

sand—none other for dispensing with the disgusting labors of the *vilans*, who poison the air nightly with the load of impurities which they carry to the docks, and charge the community for the work.

Did the whole matter rest on the advantage gained in these respects, it would justify the city in uniting the two branches. Let the community reflect a little on these matters. Take the case of the City Hospital, as one among innumerable public buildings in the city. The managers have built, with much care, a cess-pool on their grounds, which lie in the centre of population,—and built it after an application for permission to make or use a sewer, was made to the last Common Council, but neglected in that body. The excretion from two or three hundred sick persons, gathers in the cess-pool daily, and there remains. If it were sent off by a sewer, it would reach, before decomposition, a good disinfecting agent, the salt water: but instead of that, the gases from it escape from day to day, and mingle with the air we breathe! And yet the same thing exists with all our public buildings, our schools, hotels, and places where people congregate in numbers, engaged in some industry, and to a less serious extent, with all our dwellings. Is it not a great point, on the score of delicacy and health, to get rid of these nuisances and their poisonous exhalations?

"The principal gas given out from these deposits, (says Dr. Duncan in his report to Parliament,) is sulphuretted hydrogen, the most deadly of the gaseous poisons, two or three cubic inches causing instant death when injected into a vein, or into the chest, or beneath the skin of animals. Nine quarts injected into the intestines of a horse, as a common clyster, killed it in a minute; and I have heard it stated, that it is difficult to keep horses in high condition in the neighborhood of large privies, where sulphuretted hydrogen is abundantly given out. Even when largely diluted with atmospheric air, it retains, in a great degree, its noxious properties. A dog was killed by being made to breathe one part of this gas with eight hundred parts of common air, and air containing only 1-1500th of sulphuretted hydrogen, proves speedily fatal to small birds. It is not a great many years since four men fell victims to the poison while engaged in cleaning out a privy near Brompton; and still more recently an accident of a similar nature happened at Clapham. Twenty-three children belonging to a boarding school at that place, were simultaneously attacked with violent irritation of the stomach and bowels, convulsive twitching of the muscles, and excessive prostration of strength, and two of them died in twenty-four hours. The symptoms were ascribed by the medical attendants, to the inhalation of sulphuretted hydrogen from the contents of a foul cess-pit, which had been scattered over a garden adjoining the children's play-ground."

The London report is filled with evidence of a similar kind, and hence Mr. Hawksley's testimony—"I take it for granted, that it is now conceded by every one, that cess-pools and privy-pits are not less detrimental to the health, than unpleasant to the senses, and that there cannot be a very healthy population living in the vicinity of such receptacles." And hence also, Dr. T. Southwood Smith's—"I take it for granted, that the overwhelming evidence which has been adduced to show how much the health, and even the life of the community depends on this [the drainage embracing the removal of the refuse] has entered into the legislative mind, as it has into the public mind."

As to the labors of the *vibangeurs*, it is deemed sufficient to refer to the testimony of M. Mylne, the Parisian engineer.

Q. "If you had been enabled to carry the water into the houses in Paris, [he is now engaged in that work,] would it have led to the general application of the water-closet system, as a means of cleansing?"

A. "Decidedly so: the houses were already prepared for the introduction of the system, and it was much wished for by the inhabitants; and sewers were then being constructed in all parts of the city."

Q. "Then the completion of the system, or the joining on of the system of cleansing with the system of supplying water by machinery, would have led to the supereession of the labor of the body of *vidangeurs*, or seavers, as well as of the labor of the *porteurs d'eau*?"

A. "Decidedly; it would not only have superseded the labors of the *vidangeurs*, but the nuisance of their labors, which every one who has passed the streets of Paris at the night will be well aware of;—nothing improves the habits so much, nothing civilizes a population so much, as improvements in the mode of removing the excretal."

The plan offered for adoption is free of these unpleasant features, and offers no offence to the most delicate mind. It is cleanly, healthful and economical, and accomplishes the improvement which M. Mylne so well describes.

But there are other advantages of an important character, to result from the union which has been recommended.

Few more important services can be rendered to a community constituted as ours is, than to lighten materially the household labors; such a benefit reaches to all classes of our citizens—the rich, in adding to their comforts; the middle classes, in making them independent, in some degree, of the domestics; and the poor, in enabling them to do the work of their household with greater convenience. It has been said, that the introduction of the Croton into our dwellings has greatly diminished domestic labors. To provide the means for its removal, along with such offensive material as is formed in the houses and kitchens, will be equally important, and a great blessing, (remedying as it will the unpleasant and exposing part of household duties,) and the legislator who secures this to the people, ought to be deemed as much a public benefactor, as he who diminishes the weight of heavy taxation, or so helps the productive powers of a community, that, with the same amount of labor, they may procure additional comforts.

The liberation of no inconsiderable quantity of land in our yards—as well those of stores as of dwellings—now devoted to outhouses, is a matter of no little consequence, in view of its use for other purposes. Indeed, in many places, the saving in this respect will much more than pay for any possible expense for constructing the sewers, which cannot exceed twenty-five or thirty dollars per lot—a sum too small, in view of the advantages we have named, to be much considered.

It would be easy to press into use a great variety of advantages to follow the adoption of this measure, but our readers will themselves, many of them, in the course of their reflections, fall upon them quite easily, and it will be useless to anticipate their movements in that regard. It will also be unnecessary to go into the particulars of the size, depth, ventilation, and mode of piercing the sewers, as this concerns a more advanced

stage of the question ; suffice it to say, that in London these matters have been arranged with great precision, and very satisfactorily.

It is a subject full of interest to the citizen, and when those who have not fully considered it bring their minds to act upon it, there will be but little hesitation in forming the true judgment, and still less in demanding from the Common Council the fulfilment of their wishes.

It is too large a subject to be trifled with, too important to be postponed ; disease will soon lay its hand upon the city, to the loss of that reputation for health which now constitutes an element—an important element—in the value of its property, the extent of its business, and its general prosperity.

If we have not committed our interests into the hands of Lilliputians—who can for a time bind them down, acting on their small conceits and trifling prejudices—we shall presently have this matter placed on its true footing, and large, well considered and manly views will prevail.

New York, by her position and rank, is entitled to insist that her municipal legislators shall come up to the point of excellence which is required to maintain her great character ; and we trust, confidently, that experience will show they have the loftiness which befits them for the task.